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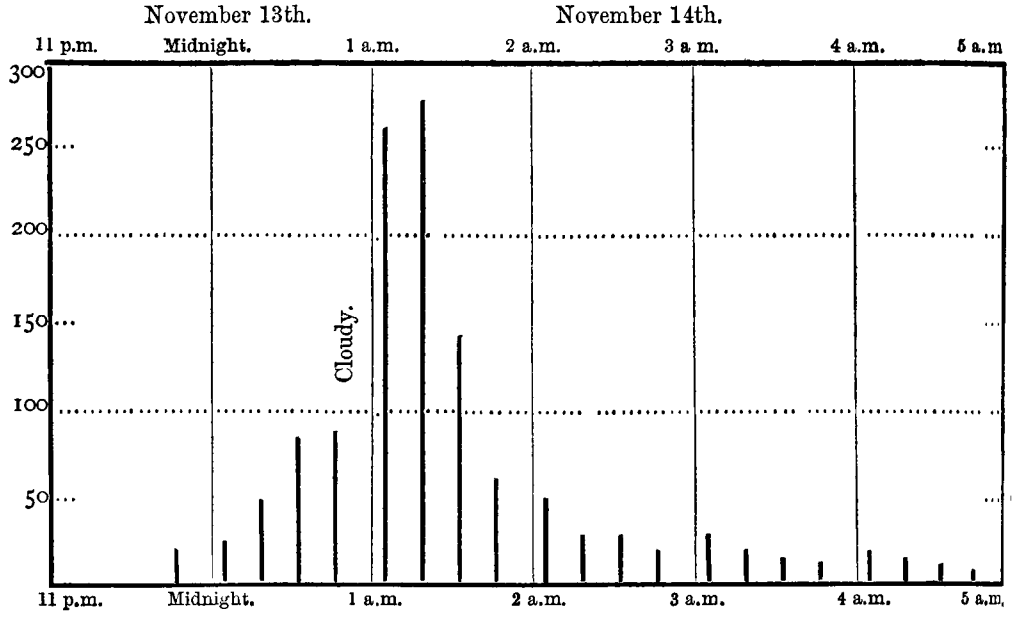
THE METEOR SHOWER OF NOVEMBER 13TH-14TH.

Properly to describe the beauteous display of the memorable November night is no easy task, and one we would gladly avoid, but many missed the sight, and for their sakes and also perchance for future reference, we make the attempt. The air was clear, crisp, and bright, as if borrowed from December or January—in fact, as free as possible from all the ordinary attributes of November weather. Traces of cloud on the northern horizon, but otherwise cloudless; in the N.E. there was a faint glow of light (auroral like), until about 2 a.m.; temperature 41°; the ground as firm as if frozen; these the atmospheric conditions. Watch was kept at Camden Town, at intervals from 9 p.m., but no meteors were seen until 11.13 p.m. At 11.45 p.m. regular counting was commenced with the results mentioned on p. 90, and shown in the accompanying diagram. The total number counted between 11.45 p.m. and 4.50 a.m. was 1222, but as they were only counted during 5 minutes out of each quarter hour, the number must be tripled to reach the number which continuous counting would have given—viz., 3666; addition must also be made for those hidden by cloud (from 12.30 to 1 a.m.), and for those which escaped counting at the time of maximum frequency (1.10 a.m.)—perhaps 5 per cent.—we then get nearly 4000 for the portion of the sky watched, and we shall probably be considerably under the truth if we put the total number visible at 8000—more than half of them appearing between 1 and 1.45 a.m., while at 1.12 a.m. they averaged quite 100 per minute. At this time, the constellation Leo, whence almost all the meteors radiated, was well out of the mist in the horizon, and was dotted with balls of light with tails so foreshortened that they seemed but elongations of the head, while around, as from a fiery crown, meteors mostly more brilliant than Sirius (which was shining in the west) darted north, south, and west—their bodies mostly white as the ball of lime in an oxy-hydrogen lamp, their tails always brightest in the middle of the track and generally invisible close to the head. Several remained visible long enough for the telescope to be turned to them, and careful remarks made on their apparent structure; usually they were much wider in the middle than elsewhere, and on two occasions were observed to bend before they faded from sight; it looked as if they were heavier in the centre, or as if a gust of wind had swept across their track. Most of the trains were tinged with green, but purple and other tints were by no means absent, the resultant beauty when (as was often the case) two or three differently tinged trains were visible in close proximity was extreme.

Number of Meteors counted in periods of 5 minutes each, the watch being kept constantly towards Leo.



NOTES ON THE METEOR SHOWER.

ENGLAND.

TWICKENHAM (*J. R. Hind, Esq.*)—Number of meteors, from midnight to 1 a.m., 1120; 1 a.m. to 1 h. 7 m. 5 sec. 514 were counted, and many more visible; at the latter moment there was a sudden increase, which rendered enumeration impossible; after 1.20 a decline became perceptible; from 1.52 to 2.9, 300 were registered; from 3.9 to 3.24, 100; from 4.42 to 5, 12; and from 5.45 to 6, only 5. Maximum frequency at 1.10 a.m.

PRIMROSE HILL (*Mr. Crumplen*).—Large meteors very abundant shortly after 10, the number rapidly increasing for the next three hours; between 0.25 and 0.35 421 were counted (two observers), afterwards many more; from 2.7 to 2.17 only 149. Some trails visible 10 minutes after the head had disappeared; they were mostly of a brilliant pea green colour. Eight of them were observed through a Dollond's telescope 1½ inch aperture, power 30; they were then found to exhibit tremulous motion, and in a few instances, curled themselves up and apparently began to descend. Radiant, R.A. 147°; N.P.D. 66°.

LONDON.—About 1.15 a meteor, starting nearly from the horizontal line of stars in Orion, crossed the sky towards the west, and as generally the case with the other meteors, the nucleus first disappeared, after a momentary increase of brilliancy, leaving behind it a long line of train, the centre of which remained bright for some instants; I continued to look at it surprised that it remained so long visible. It appeared then as a streak about the length of two diameters of the sun gradually becoming fainter and more confused, so that I was almost thinking that there might be some nebula accidentally situate behind that part of the sky into which it had dissolved. Still I did not lose sight of it, but after two or three minutes I observed that this remnant of the meteor was slowly going lower in a line rather inclined to the west, but nearly coinciding with its meridian. At last it disappeared entirely, after having travelled during ten minutes a length of two or three diameters of the sun.

COVENTRY—(*W. W. Tyler, Esq.*)—From 10.30 to 12 counted 30 meteors; from 12 to 1, 250; just before I counted 800 in 15 minutes; after that it was impos-

sible to count them, 8, 10, or 20 being visible at once ; trails either blue or green ; the head usually became extra brilliant at the moment of extinction. Sky clear, with occasional rain clouds.

PRESTON—(*Mr. T. Aspden*).—Occasional heavy hail showers and strong wind, but the meteors were well seen through gaps in the clouds ; the grandest display was at 1.10 a.m.

PUTNEY—(*Dr. Phipson*).—First meteor seen at 9.20. Out of many thousand meteors, only 5 were noticed which did not accord with a radiant in Leo.

DOVER.—Began soon after 10 p.m.; most numerous about 1; decreased rapidly by 2, after which it was cloudy. Lightning in N. all night. Often several meteors visible at once, running in parallel lines of various colours.

LEICESTER.—Stormy night ; lightning and rain. Meteors very numerous as seen through gaps in the clouds.

NOTTINGHAM.—Cloudy with rain till 12.30 ; sky then cleared, though thunder and lightning continued. Very brilliant display ; like a luminous fountain.

LIVERPOOL.—Overcast with a furious storm, but the sight was well seen at intervals when the clouds broke.

SOUTHAMPTON.—The star shower lasted from 11.30 p.m. to 6 a.m.

WEYBRIDGE—(*B. Scott, Esq.*)—Four inexperienced counters noted between 11.15 and 11.25, 9; 11.25 to 11.30, 13; 11.30 to 11.37, 23; 11.37 to 12.0, 89 ; 12.0 to 12.30, 452 ; 12.30 to 12.45, 795 ; 12.45 to 12.47, 152 ; after this, it was impossible for us to count them. Between 1 and 2 a.m., the singular phenomenon was noticed of two meteors approaching each other so closely as to become involved in mutual attraction, and they passed out of sight revolving round each other (like partners hands across in a country dance) describing spirals of light. Our impression was that even during the fullest flow the stream of meteors did not run evenly, but fitfully, as it were in waves.

GLOUCESTER.—First seen about 11 p.m.; cloudy afterwards till about 1 a.m., whence till 2 the display was magnificent.

WEYMOUTH—(*G. Bishop, Esq.*)—Maximum at 1 a.m.

CLIFTON—(*Dr. Burder.*)—Overcast for 15 minutes between 12 and 1 a.m.; at other times thin haze, but generally cloudless throughout the night. No meteors till 11 p.m.; number increased rapidly about 1 a.m., and the maximum was reached at 1.5 a.m. Between 1.5 and 1.7 81 were counted in one half the sky ; between 1.11 and 1.20 200 were counted, from 1.22 to 1.31 200, mostly about the apparent size of Sirius ; the trains mostly of a delicate greenish hue and strikingly phosphorescent. Radiant on a line between gamma and mu Leonis, 3° from gamma and 5½° from mu.

MILLAND, LIPHOOK, HANTS—(*Rev. J. M. Heath*).—"At about half-past one o'clock this morning, my attention was attracted to a meteor brighter than the others which were showering over the sky, and which was passing nearly in a line from Castor and Pollux to the Pleiades. This meteor left a trail behind it, as did many others also ; but this trail did not rapidly disappear, as most others did, but remained distinctly visible for an unusually long time. I estimate the time it lasted as about three or four minutes. During all this time I distinctly saw that it was revolving about an axis within itself. It had thus revolved through more than a right angle before I lost the power, from its faintness and the alteration of its shape, of saying what its direction was. When I first suspected that it was revolving, it pointed directly to the Pleiades ; before that, therefore, it must have pointed to the west of them. I then distinctly watched it, and saw it move in the direction contrary to that of the hands of a clock until it was at right angles to its first position, and it remained visible for some time after that. During all this time the shape was undergoing alteration. What was at first a band of nearly uniform breadth, tapering only towards the extremities, gradually became thicker in the middle as it shortened itself, and had the shape of a section of a lens."

WROTTESLEY (*Mr. Hough*).—The colour of the trains was generally greenish blue.

WISBECH.—(*S. H. Miller, Esq.*)—Fine meteoric shower (observations interrupted at 1.10 a.m. on 14th by a storm, wind 5lbs. pressure); total counted, 1157.

CALNE.—(*Col. Ward.*)—Brilliant display of meteors on 14th ; lightning in S.E.

GOODAMOOR.—(*H. H. Treby, Esq.*)—The early part of the night (13th) was cloudy, with showers, but after midnight it cleared in time to see the predicted shower of meteors, a sight not new to me, having been so fortunate as to have seen the one of Nov. 1833, at about one o'clock in the morning of 13th, they were so numerous and fell so fast, that I could not pretend to count them; they seemed to prevail most in the north-east part of the heavens. Many persons doubted my story, thinking it an after-dinner vision, as it was on my return from a party at Newnham Park in this parish, on horseback, that I saw them; it was most wonderful and not to be forgotten by me.

PENZANCE (*The Times*).—Meteors most abundant about 1 a.m., when the wind was strong from the N. Very few fell towards the horizon. The succeeding night was cloudy till after 2 a.m.; after that hour it is reported to have cleared and "revealed the same effects as on the preceding night."

OXFORD OBSERVATORY (*Rev. R. Main*).—Maximum frequency at 1·24. In one particular instance the train of a meteor was visible for some minutes; this was the train of a bright meteor which disappeared in the belt of Orion, leaving the train apparently attached to Zeta Orionis, and giving to that star the appearance of a comet with a tail of nearly 3°, standing out at a position angle of nearly 135°. It then detached itself from the star, keeping up the same route as the meteor, but forming itself into a ball of faint cometic appearance of about 15′ diameter, which grew dimmer and more diffused, and disappeared altogether after a lapse of about 4m. to 5 m. at a distance of nearly 1° from Zeta Orionis, at a position angle of about 200°. This meteor appeared at the time of the greatest display, at 13h. 24m. Only in two instances meteors were seen to burst, one in the east and another in the north.

HULL (*W. Lawton, Esq.*)—Am informed several meteors were seen on the previous day (about 3 a.m. on 13th) through a gap in the clouds. About the time of maximum, 1.10 a.m., the number was between 100 and 200 per minute. The next night and morning (14th-15th) the sky was cloudless, but no meteors were seen.

GREENSIDE MINES, PATTERDALE.—(*Mr. J. Barningham.*)—On 13th November about 7 p.m. I was astonished with a glare of light as if by an explosion of gunpowder, sufficiently light to read by; on turning round my face to the S., I saw N.E. of the constellation the Great Bear, a long train of light about 4 yards long; but the most brilliant light only lasted 2 seconds. Many bystanders saw it with cries of astonishment.

WEYMOUTH (*Dr. Allnatt*).—Splendid display; slight crackling sound, perhaps due to the rippling of the tide.

ALDERSHOTT (*The Times*).—A letter from L.G.M., referring to the remark of Dr. Allnatt as to sound, states that it was distinctly heard by the writer and a friend.

WELLINGTON COLLEGE (*R. Granville*).—Heard the same sound as Dr. Allnatt, in the quadrangle of this college, at intervals between 1 and 2 a.m.

[The above are the only intimations of sounds having been heard, and singularly enough two are from the same neighbourhood, while the other is not positively affirmed. The contrary assertion of absolute silence is so frequent that a list of places would be wearisome.—ED.]

WALES.

CARDIFF (*Messrs. Thompson*).—At 1.8 a meteor three times the apparent size of Jupiter, shot from Castor through the Pleiades, purple nucleus, train some minutes broad, at first quite straight; a part about 15° long near Aldebaran remained visible after the ends had faded, and assumed a serpentine form, afterwards took the form of a small oval cloud and moved from Taurus towards Orion, being visible as a faint cloud until 1.20, or 12 minutes from its first appearance.

ABERCARN.—(*Rev. D. Charles.*)—The remarkable shower of meteors was observed here on the 13th. It commenced at midnight and continued until 3 a.m.; the maximum being about 1 a.m. (14th) when there appeared a real shower of fire. From a reckoning made at the time, it was calculated that 20,000 must have fallen within the circle of our horizon.

HAVERFORDWEST.—(*E. P. Phillips, Esq.*)—On the night of the 13th, a little after midnight, the sky clear, and gale from N.W., the splendid phenomenon of the

meteors was well seen ; they appeared to pass with amazing rapidity and in countless numbers from S.E. to N.W. in direct opposition to the gale. They were visible till 4.30 a.m.

SCOTLAND.

BALLATER, ABERDEEN (*J. W. Patterson, Esq.*)—Meteors first observed about 11 p.m., but "after midnight the sight was really wonderful, there being a constant succession of them all across the heavens (like the file-firing of a company of riflemen but without the noise)." About 2 a.m. the sky became overcast with heavy rain.

GLASGOW (*A. S. Herschell, Esq.*)—Number of meteors seen per minute by one observer, watching half the sky—at 12.15, 2 ; 12.45, 12 ; 1, 25 ; 1.10, 56 ; 1.20, 57 ; 1.24, 43 ; 1.30, 30 ; 1.35, 21 ; 1.45, 5 ; 2, 1. Meteors mostly white or orange, their streaks emerald green. "Large meteors appeared at 12.33, 12.41, 2.14, and 2.42, they left streaks which endured from 5 to 14 minutes ; each of the eccentric streaks contracted itself into a knot of light, which drifted, cloud-like, 8 or 10 degrees before it vanished. The last presented an imposing ring of flame 3 or 4 degrees in width ; it remained visible for 14 minutes, gradually expanding itself into a heart-shaped loop, until it enclosed the chief stars of Ursa Major in a wide fantastic wreath before it disappeared."

LOGIERAIT.—(*Rev. G. D. R. Munro.*)—The meteor phenomenon was witnessed in all its splendour between midnight and 2 a.m. (on 14th); at times the whole heavens seemed as if lighted up, countless meteors shot along the sky in all directions though generally the course was westward from Leo ; at times they appeared as if in pairs, and after running in parallel lines would diverge. Many were seen to burst, giving forth exquisite shades of color ; the sky was cloudless throughout. Though carefully listened for, no sounds were heard.

ABERDEEN.—(*Rev. A. Beverley.*)—Magnificent meteors seen by thousands.

IRELAND.

MONKSTOWN.—(*A. Pim, Esq.*)—The meteors were seen from here in great brilliancy on the night of the 13th ; they commenced falling in small numbers about 10.45 ; by 11.15 the number was greatly increased, in 6 minutes, from 12.24 to 12.30, I counted from my window (facing the N.W. and from which I could see about two-fifths of the sky) about 375, or at the rate of 3,800 per hour if continued; the direction of all being from E. to W.; some were of great brilliancy with long trains; at 3.30 a.m. they appeared to have ceased.

FOREIGN.

SPAIN, SARAGOSSA (*J. C. Robinson*).—Sky cloudless ; about midnight a very abundant shower ; all left a well-defined trail of pale bluish sparks ; the heads usually white, but sometimes vivid emerald green, or tinted with pink or crimson.

MEDITERRANEAN, MALTA (*The Times*).—A letter from W.W. gives the maximum display at 1.30 to 2 a.m.

MEDITERRANEAN, MALTA (*J. P. H. Boileau, Esq.*)—Number at the lowest computation, 200 per minute; but it was impossible to count them, it was like a shower of hail. Fifteen sentries were interrogated with a view to determine the duration ; the result being—commencement 1 a.m., maximum 2.30, over about 5 a.m. Only one seen on the following night.

ITALY, ROME.—Father Secchi, Director of the Observatory, is stated to have gone up into the mountains to lessen the chance of his observations being prevented by cloud ; but both there and at Rome the sky was uniformly overcast.

THE METEORIC SHOWER IN AMERICA.—The meteors observed in America were not so numerous as those seen in England. Arrangements had been made in several cities to ring the bells in order to arouse the people if the spectacle should be such as was expected ; but it was not. Professor Loomis, of Yale College, makes the following report :—"On Monday night, November 12, a company of observers at this place counted 696 shooting stars in five hours and twenty minutes, which is about four times the average number visible for the same period throughout the year. On Tuesday night, November 13, another company counted 881 shooting stars in five hours, which is five times the average number. On Wednesday night the sky was overcast, so that no observations could be made. We conclude that the number of shooting stars visible about the 18th was very remarkable ; never-

theless, this display is not to be compared with that of the 13th of November, 1833, in which the number of meteors was variously estimated at from 10,000 to 30,000 per hour. The grand display, therefore, which it was supposed might possibly occur this year has not been witnessed in the United States. . . If we receive no accounts of an unusual display of meteors this week in any part of the world, we shall look with considerable confidence for such a display on the 14th of November, 1867."

INCOMPLETE RAIN GAUGE EXPERIMENTS.

The following paragraph with reference to some desultory experiments at Camden Road, appeared on the cover of last month's Magazine :—

"I may just mention that *at present* there appears to be a considerable increase in the amount collected by gauges whose funnels are of glass and pot—*i.e.*, unoxidisable surfaces, the excess being nearly 6 per cent. ; and that gauges thoroughly protected from evaporation *may* exceed unprotected ones by about the same amount. Therefore (so far as the present observations go), a thoroughly protected gauge, with a permanently smooth surface would, apparently, exceed an ordinary one by nearly 12 per cent.—an enormous difference, and one which needs close scrutiny."

So many inquiries have been made respecting these experiments that I am reluctantly induced to print the results hitherto obtained—reluctantly, because they must, for several reasons be accepted with considerable reservation, and subject to correction, perhaps even to reversal by the better conducted series which will commence from January, 1867, prior to which time these and some other gauges will be placed on the lawn of Frampfield Lodge, Sussex, under the care of my friend, the Rev. T. E. Crallen, who has most kindly undertaken to continue the observations. A few words as to the "shelf gauges" will conclude; they were always all measured with one glass, hence any slight error in it would be common to all, but it is not 20 grains (= 0·004 in.) wrong at any point. The funnels are not at present *perfectly* uniform, but their areas are not sufficiently different to account for the differing indications; they are as under:—

N.W. end of shelf,	diameter	5·000	inches,	therefore	area	= 19·64 in.
Glass funnel gauge	,,	5·003	,,	,,	,,	= 19·65 in.
Earthenware ,,	,,	4·987	,,	,,	,,	= 19·58 in.
White Can ,,	,,	4·997	,,	,,	,,	= 19·62 in.
Sand buried ,,	,,	5·000	,,	,,	,,	= 19·64 in.
S.E. end of shelf	,,	5·003	,,	,,	,,	= 19·65 in.

The effect of these variations, amounting only to $\frac{1}{300}$th of the total area, is practically nil. A more serious source of uncertainty is the fact (only recently noticed) that the rims are not all equal in slope, so that possibly the excess caught by the glass and pot funnelled gauges is due in whole or in part to insplashing from their flatter rims. As most clearly showing the results obtained, the observations are entered as differences from a standard in each series, as stated in the table.

Subject to full correction by future and better conducted observations, the results may be thus epitomized. (1) An 8 in. gauge catches 1 per cent. more than a 5 in. gauge, if both are under similar conditions, (2) a gauge measured monthly, if well protected against evaporation, records 4 per cent. more than it would if read daily, (3) a gauge with a glass funnel collects 7 per cent. more than one with a metal funnel, (4) a gauge with a funnel of white earthenware, collects 4 per cent. more than one with a metal funnel, (these results are open to question for the reason stated above), (5) a gauge painted white records rather more (2 per cent.) than one painted black, perhaps because it is less heated by the sun, because (6) a gauge buried in wet sand, and with other provisions against loss by evaporation, exceeds an unprotected one by 5 per cent., and if read monthly, probably exceeds an unprotected one read daily, by about 8 per cent. *All these results must, however, be considered liable to contradiction.*

Conscious that I have not given, have not been able to give, to these observations the care they merit, I have the satisfaction of having broken ground, and the far greater satisfaction of knowing that henceforth they and the questions arising from them, will be in the able hands of Mr. Crallen.

Gauges on, or partly sunk in, the ground. Gauges on a shelf running N.W.,S.E.

Read daily at 9 a.m.&9 p.m.			Read at 9 a.m. 1st of month			Read monthly at 9 a.m. on the 1st,				
1866	8 in. Glaisher's gauge. 6 in. above ground.	5 in. Casella can gauge, bottle, & india rubber collar. 6 in. above ground.	5 in. Casella can gauge, bottle, & india rubber collar. 6 in. above ground.	5 in. Casella can gauge, *no* bottle. 1 ft. above ground.	5 in. Negretti gauge. 1 ft. above ground.	Mean of two gauges, one at each end of the shelf. Black can gauges, no bottle inside.	Black can gauge, no bottle inside, but with a glass funnel instead of a metal one.	Black can gauge, no bottle inside, but with an earthenware funnel instead of a metal one.	White can gauge, no bottle inside.	Black can gauge, with bottle and india rubber collar; it is bedded in a large closed case of wet sand.
April..	1·76	+ ·02	+·09	—·05	+·08	1·68	+ ·15	+·08	—·01	+·03
May...	2·03	— ·02	+·02	—·11	·00	1·83	+ ·22	+·11	+·07	+·13
June...	3·98	+ ·02	+·08	+·01	—·04	3·65	+ ·30	+·13	+·11	+·13
July...	1·19	— ·03	+·04	—·09	—·01	·98	+ ·11	+·09	—·08	+·15
Aug...	2·76	— ·02	+·12	+·02	—·04	2·51	+ ·25	+·17	+·08	+·24
Sept...	3·88	— ·09	+·26	+·26	—·08	3·97	+ ·12	+·09	+·09	+·12
Oct....	2·32	— ·04	—·01	—·12	—·13	2·14	+ ·05	+·06	+·02	+·03
Nov...	1·73	— ·03	—·02	—·23	—·11	1·55	+ ·13	+·06	+·01	+·05
Sums	19·65	—0·19	+·58	—·31	—·33	18·31	+1·33	+·79	+·29	+·88

To the Editor of the Meteorological Magazine.

Barlaston, Stone, Staffordshire, Nov. 29th, 1866.

DEAR SIR,—On the cover of the Magazine for the current month, you say—"There appears to be a considerable increase in the amount collected by gauges whose funnels are of glass and pot—*i. e.*, unoxidisable surfaces, the excess being nearly 6 per cent.," &c.

It may be satisfactory to you to know that my two gauges, placed side by side, one with a funnel 13¼ inches in diameter, made of fine glazed earthenware; the other a metallic Casella's 5 in. gauge, tested by yourself, register practically the same amount, the difference being, *not* 6 *per cent.*, but scarcely *one-hundredth of an inch*, after the heaviest rainfall. I am, therefore, inclined to think that the experiments referred to were not conducted with precision, or that the two sets of gauges were not placed in the same situation. Indeed, I do not see how so great a difference could be accounted for by any difference in the material of the funnels.

I remain, yours truly, WILLIAM SCOTT.

MIGRATION OF SWALLOWS.

Shortwood House, Staines, 19th October, 1866.

DEAR SIR,—The swallows disappeared earlier than I ever remember—viz., on 30th September and 1st October, from this neighbourhood, but more were seen on Wednesday afternoon, the 3rd, when we had a higher temperature, and some were here as late as 13th inst. My observations on this head have led me to believe for some years that these birds keep travelling *southwards*, for a fortnight before they all leave, that those from the *southernmost* parts of the island go first, and that their place is supplied from the midland districts, which are in their turn supplied from the north, and so on till all are gone. This is only theory, yet I am led to believe it, although I once saw swallows flitting about the race-course at Leicester, on 7th November, but I fancy these must have been late hatched birds, which could not encounter the long flight of their parents; this was, I think, ten years since. Three years ago I saw a few martins near Runnymede, on 13th November.

I have not registered a drop of rain this month till yesterday morning, when there was $\frac{1}{18}$ of an inch, and this morning $\frac{7}{29}$=nearly half-an-inch, which fell in twenty hours.

I am, dear Sir, yours faithfully,

HENRY ST. JOHN JOYNER.

RAINFALL IN NOVEMBER, 1866.

Div.		STATIONS. [The Roman numerals denote the division of the Annual Tables to which each station belongs.]	Height of Gauge. Above Ground ft.	in.	Above Sea Level. feet.	Depth of Rain. Total Fall. inches.	Difference from average 1860–5 inches.	Greatest Fall in 24 hours. Depth. inches.	Date.	Days on which .01 or more fell.
I.	ENGLAND.	Camden Town	0	6	100	1·73	— ·68	·37	10	14
II.		Staplehurst (Linton Park)	0	6	296	1·89	—1·30	·37	13	13
,,		Selborne (The Wakes)	4	0	500 ?	2·08	—1·46	·53	8	14
III.		Hitchen	2	0	240	1·68	— ·46	·42	13	12
,,		Banbury	7	0	345	1·71	— ·49	·43	10	14
,,		Wisbech	0	6	10	2·24	...	·46	10	12
IV.		Bury St. Edmunds (Culford)	1	2	...	2·66	+ ·27	·43	10	12
V.		Calne	0	11	250	2·31	...	·55	12	12
,,		Plymouth (Goodamoor)	0	2	580	4·14	—1·46	1·46	11	17
,,		Barnstaple	0	6	31	3·91	— ·23	·75	11	22
,,		Taunton (Fulland's School)	1	4	...	1·14	—1·96	·45	9	7 ?
VI.		Shrewsbury (Highfield)	5	6	200	2·25	+ ·27	·42	8	17
,,		Tenbury (Orleton)	0	9	200	1·66	— ·81	·45	11	18
VII.		Leicester (Wigston)	0	6	220	2·28	+ ·12	·40	11	13
,,		West Retford	0	6	50	...	...	...	...	...
,,		Derby	5	0	180	3·06	+1·43	·42	10	19
VIII.		Manchester	2	7	106	5·72	+2·96	1·24	15	18
IX.		York	0	6	50	2·39	+ ·41	·84	17	15
,,		Skipton (Arncliffe)	3	0	750	9·45	+3·00	2·16	15	19
X.		North Shields	1	0	124	2·23	— ·48	·58	15	13
,,		Borrowdale (Seathwaite)	1	0	422	23·08	+6·41	6·38	16	22
XI.	WALES.	Abercarn	1	3	450	3·41	...	·87	10	10
,,		Haverfordwest	2	0	60	5·24	— ·43	·97	11	10
,,		Rhayader (Cefnfaes)	2	0	880	4·86	+ ·28	1·20	12	17
,,		Llanberis (R. Victoria Hotel)	1	0	370	8·70	...	1·87	15	20
XII.	SCOTLAND.	Dumfries	0	5	70	4·07	+ ·85	·87	15	21
,,		Hawick (Silverbut Hall)	4	0	512	3·38	...	·74	1	17
XIV.		Ayr (Auchendrane House)	2	3	94	6·17	+2·10	1·09	15	23
XV.		Otter House	0	6	130	...	...	...	...	...
XVI.		Leven (Nookton)	0	6	80	2·12	— ·92	·50	15	10
,,		Stirling (Deanston)	0	0	130	3·35	— ·16	·50	15	17
,,		Logierait	1	0	250	2·76	...	·53	11	16
XVII.		Ballater	0	10	656	1·96	...	·59	15	18
,,		Aberdeen	4	8	115	2·16	...	·42	10	19
XVIII		Inverness (Culloden)	3	0	104	2.64	...	·83	16	8
,,		Fort William	0	8	20	8·40	...	1·45	7	25
,,		Portree	0	4	60	8·10	—2·38	·80	4	27
,,		Loch Broom	0	8	48	9·25	...	·80	13 & 15	28
XIX.		Helmsdale	1	0	34	4·97	...	·69	7	24
,,		Sandwick	2	0	78	8·24	+4·24	1·05	12	26
XX.	IRELAND.	Cork	6	0	65	4·14	...	1·61	30	19
,,		Waterford	4	0	60	2·34	—1·61	·72	10	18
,,		Killaloe	5	0	128	4·77	— ·12	1·00	30	19
XXI.		Portarlington	1	2	236	1·89	—2·03	·40	11	19
,,		Monkstown	0	6	100	1·33	—1·56	·30	10	20
XXII.		Galway	6	0	25	4·02	...	·82	30	22
,,		Bunninadden (Doo Castle)	1	0	...	4·25	...	·64	15	26
XXIII		Bawnboy (Owendoon)	1	3	218 ?	5·46	...	1·36	15	24
,,		Waringstown	0	4	191	2·85	...	·86	15	23
,,		Strabane (Leckpatrick)	0	5	260	5·97	...	1·17	15	27

+ Shows that the fall was above the average ; — that it was below it.

METEOROLOGICAL NOTES ON THE MONTH.*

ABBREVIATIONS.—Bar. for Barometer; Ther. for Thermometer; Max. for Maximum; Min. for Minimum; T for Thunder; L for Lightning; TS for Thunderstorm; R for Rain; H for Hail.

ENGLAND.

CAMDEN TOWN.—Thick fog on morning of 10th; heavy R from 9.5 to 9.12 a.m., ·18 in 7 minutes. Lunar halo at 9 p.m., on 17th.

LINTON PARK.—A fine month, the beginning and end particularly so; L on the 2nd, 4th, and 5th; no high winds. Fogs few, and never intense; 12 frosty days, the sharpest being the 21st. Wind mostly W., N.W., and S.W. Bar. very unsteady about 16th and 17th; more settled towards the end. Evenings, when no moon, very dark, but as a whole the past month has been one of the finest on record for November.

SELBORNE.—Remarkable variations of both bar. and ther. from 16th to 21st; bar. on 16th, 28·85; 17th, 29·80; 18th, 29·27; max. ther. on 16th, 50°: 17th, 33°; 18th, 48°; 19th, 33°; and 20th, 32°; max. of month, 55° on 2nd; min. 23° on 20th; aurora on 8th.

BANBURY.—L on the 3rd. Max. 57°·5; min. 27°. Bar. rose more than one inch from 3 p.m. 16th to 9 a.m. on 17th. Fog on 28th.

WISBECH.—The first fortnight dull, the last week fine. White frost on 10th; lunar halo on 17th. Min. 28°·1 on 21st. Fine meteoric shower on 13th; total counted 1157; observations interrupted at 1·10 a.m. on 14th by a storm with L; pressure of wind, 5lbs. T on 24th.

CULFORD.—Max. 58° on 2nd; min. 23° on 9th. Month as a whole favourable for November. Meteors seen on 13th and 14th.

CALNE.—Violent wind and rain in the night of 10th, hard frost, dahlias, &c., killed. Max. 59°·5 on 3rd; min. 23° on 21st. Brilliant display of meteors on 13th, L in S.E.

GOODAMOOR.—A very wet and stormy night on 10th, after white frosts on 9th and 10th. Showery till midnight on 13th, when it cleared and meteors were seen.

TAUNTON.—Max. (in sun) on 2nd, 80°·5; min. on 21st, 29°·5.

ORLETON.—Warm damp month. Snow on 19th and 20th.

WIGSTON.—Weather fine and open, wheat sowing has progressed more auspiciously than could have been expected considering the wetness of the autumn.

DERBY.—An unusual flood (higher than has been known for 25 years) occurred on the 17th, in the low-lying districts of this neighbourhood, and also a portion of the town; the flood mainly attributable to the heavy and continued rainfall north of Derby.

MANCHESTER.—On the 14th and 15th the Irwell rose 25 ft. above its usual level, flooding a great part of Lower Broughton and Salford, and doing much damage; the rainfall of the 5 days preceding and including the 16th exceeded the average for the whole month.

YORK.—The rainfall on the 15th and 16th amounted to 1·34 in. in 30 hours, the average for the whole month being under 2 in. The river Ouse here rose 15 ft. above its summer level, but at Selby, 15 miles lower down, below the confluence of the Wharfe, much damage was done, and the floods in the West Riding were most disastrous.

ARNCLIFFE.—The rainfall on the 15th and 16th was 4·73 in., the average for the month being only 6·45.

NORTH SHIELDS.—15th, 16th, and 17th, rainfall amounted to 1·12 in.; the whole month only 2·23 in., being nearly half-an-inch below the average.

SEATHWAITE.—On 8 days more than 1 in. of rain, one of those days, the 7th, having 2·88 in., and the 16th, the large amount of 6·38 in., approaching very closely to the max. fall in 24 hours, during the 22 years, and having only been exceeded three times. Cumberland has escaped without damage from the prevailing floods, though the fall at some places (the Stye, for instance, 32·65 in.) has been enormous.

WALES.

ABERCARN.—From 1st to 9th fine, mild, and calm; 10th to 16th rainy and stormy; 17th to the end cloudy and foggy, though but little R.

* Notices of the meteor shower are given on pages 92 to 95.

HAVERFORDWEST.—First half of the month wet, damp, gloomy, and at times blowing heavily, particularly on the 12th and 13th. Only three frosty nights during the month; snow on the hills on the 17th and 20th.

RHAYADER.—Weather generally damp and mild, heavy clouds and mists prevailing.

LLANBERIS.—More than 1 in. of rain on three days.

SCOTLAND.

DUMFRIES.—The first half of the month wet and stormy; only one day without rain till the 18th; 19th to 21st frosty and fine; thence to 25th showery; fine to the close of the month. Snow on the hills, on 14th, 16th, 18th, and 25th. The sunrise on the mornings of the 26th and 27th, unusually magnificent.

SILVERBUT HALL, HAWICK.—Falling stars, and high winds, on 6th, 7th. & 8th. Showers of meteors on 13th. On the 15th, about 7, a brilliant white luminous arch was visible for half-an-hour in the northern hemisphere; it spanned nearly a third of the horizon, the stars very dim were seen through it, and although it resembled an arch of the Aurora Borealis, it presented none of its flitting uncertain characters. Rivers full on 15th, and overflowing next day, 1·03 in. of rain having fallen in those two days; gathered green peas on the 5th.

AUCHENDRANE.—The river in high flood during the whole month, but never beyond its banks; highest on the 16th. Max. 58° on 1st; min. 23° on 17th. 24 hours of nearly continuous rain on 14th and 15th. Bar. on 15th at 9 a.m. 29·90; at 9 a.m. 16th, 29·16; and at 9 p.m. on the same day, 29·73.

DEANSTON.—Max. 56° on 1st; min. 22° on 17th; very high winds, on the 5th and 8th; heavy snow on the hills on the 17th, some snow showers on the 19th. Meteoric showers on the night of 14th, very distinct; 2·90 in. of R fell between 1st and 18th.

LOGIERAIT.—A remarkably fine month, notwithstanding stormy days; we had the first and hitherto the only covering of snow this season on the 16th, and from that date to the 20th very keen frosts.

BALLATER.—Lunar rainbow on 23rd. Very little snow this month.

ABERDEEN.—Max. 55°·7 on 1st; min. 27° on 17th. Smart snow showers from 16th to 19th.

FORT WILLIAM.—T about noon on 5th, and strong S.W. gale on 7th and 8th. Much snow fell on the 19th, and the weather for several days was very cold.

PORTREE.—This month has been wet, stormy, and squally, throughout. Gales on the 7th, 8th, 11th, 29th, and 30th. Fog on 10th, 21st, and 28th. 3 in. of snow on evening of 16th; frost on 11 nights. Scarlatina subsiding.

LOCHBROOM.—Without exception the most stormy November remembered by the observer; not one dry day from the 26th of October to the 29th of November, with high winds and gales particularly from the N., but no damage either by sea or land in this locality.

SANDWICK.—The month has been unprecedentedly wet, the rainfall having exceeded that of *any month during the previous* 26 *years*. Gale on 5th from 1 to 6 p.m., 66 miles per hour, and on 8th 67 miles. A severe T S on 11th, when the L struck a house about 7 miles E. of this, splitting the gable, knocking out the windows, breaking the crockery, and throwing two persons who were sitting by the fire to the other side of the room, without hurting them, though it tore the sole from one of their shoes. There was a sprinkling of snow on the 16th, and a snow-storm on 18th and 19th, followed by a thaw on the 20th.

IRELAND.

MONKSTOWN.—The month commenced warm and showery, but grew very cold towards its close, some of its variations being very remarkable, especially between the 16th and 19th; on 16th, 9 a.m., the temp. was 53°; on 17th, 34°; 18th, 49°·5; and 20th, 36°. Max. 58°·8 on 1st; min. 29° on 9th. Snow stated to have been seen on the Wicklow Hills on the morning of the 17th. A terrific gale on the 30th.

OWENDOON.—The fall on the 15th 1·36 in., the greatest yet observed.

WARINGSTOWN.—Early part of month, wet and stormy; the latter part fine, mild, and genial for the season. Frost on grass on 14 nights. Wind W. and compounds of W. on 26 days.